

# HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

---

**Hatchery Program:**

Union River Summer Chum Salmon  
Supplementation / Tahuya River Summer  
Chum Salmon Reintroduction

**Species or  
Hatchery Stock:**

Summer chum salmon, *Oncorhynchus keta*,  
Union River stock

**Agency/Operator:**

Washington Department of Fish and Wildlife  
/ Hood Canal Salmon Enhancement Group  
(U.S. Fish and Wildlife Service funding)

**Watershed and Region:**

Union River, Lynch Cove, Hood Canal, and  
Tahuya River, Hood Canal, Washington State

**Date Submitted:**

June 13, 2000

**Date Last Updated:**

## **SECTION 1. GENERAL PROGRAM DESCRIPTION**

### **1.1) Name of hatchery or program.**

Union River summer chum salmon supplementation / Tahuya River summer chum salmon reintroduction

### **1.2) Species and population (or stock) under propagation, and ESA status.**

Summer chum salmon, *Oncorhynchus keta*, Union River stock  
Hood Canal/Strait of Juan de Fuca Summer Chum ESU: Threatened

### **1.3) Responsible organization and individuals**

Agency lead contact:

**Name (and title):** Thom H. Johnson, WDFW, District Fish Biologist  
**Agency or Tribe:** Washington Dept. of Fish and Wildlife (WDFW)  
**Address:** 283236 Highway 101, Port Townsend, WA 98368  
**Telephone:** (360) 765-3979  
**Fax:** (360) 765-4455  
**Email:** [johnsthj@dfw.wa.gov](mailto:johnsthj@dfw.wa.gov)

On-site operations staff leads:

**Name (and title):** Ed Jouper, George Adams Hatchery Manager  
**Agency or Tribe:** WDFW  
**Address:** West 40 Skokomish Valley Road, Shelton, WA 98584  
**Telephone:** (360) 427-2161  
**Fax:** (360) 427-2215  
**Email:** [joupeecj@dfw.wa.gov](mailto:joupeecj@dfw.wa.gov)

**Name (and title):** Dr. Al Adams, Executive Director  
**Agency or Tribe:** HCSEG  
**Address:** PO Box 2169, Belfair, WA 98528  
**Telephone:** (360) 275-3575  
**Fax:** (360) 275-3575  
**Email:** [hcseg@hctc.com](mailto:hcseg@hctc.com)

### **Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:**

Trained volunteers and project funding provided by the Hood Canal Salmon Enhancement Group (HCSEG) which is supported by WDFW through the Regional Enhancement Program as described in RCW 75.15; technical input provided by the Point No Point Treaty Council and Skokomish Tribe

**1.4) Funding source, staffing level, and annual hatchery program operational costs.**

Source: WDFW and HCSEG; U.S. Fish and Wildlife Service

Staffing: oversight and support provided by WDFW Hood Canal Hatchery Complex staff; on site hatchery operations staffed by trained volunteers with HCSEG

Operational costs: To be determined and funded by WDFW and HCSEG

**1.5) Location(s) of hatchery and associated facilities.**

Broodstock collection: at trap on Union River (WRIA 15.0503) at RM 0.3

George Adams Hatchery: located on Purdy Creek (WRIA 15.0005), a tributary to the Skokomish River (WRIA 15.0001) at RM 4.1; eggs and milt transported to George Adams Hatchery for fertilization, incubation, otolith marking, and rearing; eyed eggs and fry transported to Huson Spring facility

Huson Spring facility: located on a tributary to Union River at RM 1.5; egg incubation, hatching, rearing, and release.

**1.6) Type of program.**

Integrated Recovery

**1.7) Purpose (Goal) of program.**

Restoration. The goal of this program is to reintroduce an extirpated summer chum salmon population to the Tahuya River using the Union River stock; and to restore a healthy, natural, self-sustaining population of summer chum salmon in the Tahuya River that will maintain the genetic characteristic of the native stock. This reintroduction shall represent a range extension of the Union River stock. A supplementation program on Union River summer chum is implemented as a strategy for boosting the abundance of the population to allow for transfers of surplus fish for the reintroduction of summer chum on the Tahuya River.

**1.8) Justification for the program.**

In the Summer Chum Salmon Conservation Initiative (SCSCI) developed by Washington Department of Fish and Wildlife and Point-No-Point Treaty Tribes (2000), Tahuya River summer chum was identified as an extirpated stock and was identified as a potential future project for reintroduction. The Union River summer chum stock was identified as “healthy” in status, rated as at moderate risk of extinction, and was identified as a potential future project for supplementation (for the purpose of developing as a donor stock for reintroduction). The Union River summer chum stock is the most appropriate donor stock for reintroduction into the Tahuya River since it is the nearest geographically to the Tahuya River and shows similarities in genetic lineage, life history patterns, and ecology to the extirpated Tahuya River summer chum stock.

This program is fully consistent with the rationale, intent, and implementation of

the supplementation and reintroduction approach identified in the SCSCI. The following is taken from the SCSCI:

Supplementation is viewed as an effective tool, in combination with other management actions, for restoring natural production to healthy levels within the Hood Canal/Strait of Juan de Fuca summer chum ESU. By the early 1990s, summer chum populations had declined to such low levels that the risk of extinction to portions of the ESU on the short term was high. Furthermore, with the recent extirpation of four populations, the need for hatchery-based actions was identified to reintroduce summer chum into vacant habitat that, based on stock assessment data, appeared unlikely to be colonized naturally within a reasonable time frame....

The intent of supplementation efforts within this ESU is to reduce the short term extinction risk to existing wild populations and to increase the likelihood of their recovery to a healthy status. These objectives can be accomplished through the establishment of supplemented populations using indigenous brood stock, and through reintroduction of appropriate populations into streams now lacking summer chum. In keeping with the intended ephemeral nature of this form of artificial production, the proposed supplementation strategy will be limited in duration and designed to help maintain the populations while potential factors for decline are identified and being addressed. Monitoring and evaluation activities proposed for the programs will provide important new scientific information regarding the effectiveness of supplementation as it relates to chum salmon. Contribution to the re-establishment of naturally functioning ecosystems through the recovery or restoration of summer chum populations, is also an intent.

... For selected, extirpated populations, seeding of usable habitats will be accomplished through reintroduction strategies developed specifically for each recipient watershed. Reintroduction planning strategies will include selection of the most appropriate donor stock, acclimation to the recipient location, and release of fed chum fry to maximize the likelihood for the establishment of a population.

### **1.9) List of program “Performance Standards”.**

Consistent with the SCSCI, a supplementation program on Union River summer chum is implemented as a strategy for boosting the abundance of the population to allow for transfers of surplus fish for the reintroduction of summer chum on the Tahuya River.

The following are objectives for the supplementation program on the Union River summer chum stock:

Objective 1: Retain future options for supplementation of the Union River stock. Develop and maintain, for 12 years (beginning in 2000), a population comprised of supplemented and naturally spawning fish using hatchery and wild-origin broodstock on the Union River.

Objective 2: Boost the numbers of naturally produced fish in the Union River using the indigenous population as the donor. Procure no greater than 50 % of the total annual number of returning females when the anticipated spawning population exceeds 250 fish. If the anticipated spawning population is less than 250, follow broodstock removal criteria set forth in the SCSCI for small population sizes. Produce a maximum of 86,000 fed fry each year for release into the Union River.

Objective 3: Monitor and evaluate the effectiveness of the supplementation program (see 1.10, below). Report the results of the program each year.

Objective 4: Reintroduce summer chum into the Tahuya River. This can proceed when the Union River stock (1) meets an identified spawner escapement objective, (2) provides the egg take needs of any ongoing Union River supplementation program, and (3) provides a minimum of 25 pairs required for a reintroduction program. Tahuya River production levels and performance standards will be described in an amended HGMP for the program.

### **1.10) List of program “Performance Indicators”, designated by "benefits" and "risks."**

This program is fully consistent with the intent and implementation of the monitoring and evaluation component for supplementation programs identified in the SCSCI. The monitoring and evaluation program in the SCSCI responds to concerns regarding the uncertainty of summer chum supplementation and reintroduction effects by addressing the following four elements :

1. The estimated contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process;
2. Changes in the genetic, phenotypic, or ecological characteristics of populations (target and non-target) affected by the supplementation/reintroduction program;

3. The need and methods for improvement of supplementation/reintroduction activities in order to meet program objectives, or the need to discontinue a program because of failure to meet objectives; and
4. Determination of when supplementation has succeeded and is no longer necessary for recovery.

#### **1.10.1) “Performance Indicators” addressing benefits.**

##### **Element 1: Estimate the contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process.**

1. Differentially mark all hatchery-origin summer chum fry to allow for distinction from natural-origin fish upon return as adults on the spawning grounds. This will be accomplished by otolith (thermal) marking or another permanent, effective method.
2. Conduct spawning ground surveys throughout the summer chum return to enumerate spawners, and to collect information regarding fish origin (via random sampling of fish heads for otoliths), and age class composition through scale sampling.
3. Estimate the number of naturally spawning hatchery-origin summer chum contributing to each supplemented population’s annual escapement.

##### **Element 4: Collect and evaluate information on adult returns.**

1. Commencing with the first year of returns of progeny from naturally-spawned, hatchery-origin summer chum, evaluate results of spawning ground surveys and age class data collections to:
  - a. Estimate the abundance and trends in abundance of spawners;
  - b. Estimate the proportion of the escapement comprised by chum of hatchery lineage, and of wild lineage;
  - c. Through mark sampling, estimate brood year contribution for hatchery lineage and wild-origin fish.

Using the above information, determine whether the population has declined, remained stable, or has been recovered to sustainable levels. The ability to estimate hatchery and wild proportions will be determined by implementation plans, budgets, and assessment priorities.

#### **1.10.2) “Performance Indicators” addressing risks.**

##### **Element 1: Estimate the contribution of supplementation/reintroduction program-origin chum to the natural population during the recovery process.**

1. Monitor escapements of non-supplemented populations to determine the level of

straying of supplementation program-origin fish to other drainages.

**Element 2: Monitor and evaluate any changes in the genetic, phenotypic, or ecological characteristics of the populations presently affected by the supplementation program.**

1. Collect additional GSI data (allozyme or DNA-based) from regional summer chum adult populations to determine the degree to which discrete populations exist in the individual watersheds.

2. Continue GSI allozyme collections of summer chum spawners throughout the region for comparison with past collections to monitor changes in allelic characteristics, and with the intent to assess whether the supplementation program has negatively affected the genetic diversity of natural populations.

3. Continue collecting and archiving DNA samples for future analysis.

**Element 3: Determine the need, and methods, for improvement of supplementation or reintroduction operations or, if warranted, the need to discontinue the program.**

1. Determine the pre-spawning and green egg to released fry survivals for each program at various life stages.

- a. Monitor growth and feed conversion for summer chum fry.
- b. Determine green egg to eyed egg, eyed egg to swim-up fry, and swim-up fry to released fry survival rates for summer chum.
- c. Maintain and compile records of cultural techniques used for each life stage, such as: collection and handling procedures, and trap holding durations, for chum broodstock; fish and egg condition at time of spawning; fertilization procedures, incubation methods/densities, temperature unit records by developmental stage, shocking methods, and fungus treatment methods for eggs; ponding methods, start feeding methods, rearing/pond loading densities, feeding schedules and rates for juveniles; and release methods for fed fry.
- d. Summarize results of tasks for presentation in annual reports.
- e. Identify where the supplementation program is falling short of objectives, and make recommendations for improved fry production as needed.

2. Determine if broodstock procurement methods are collecting the required number of adults that represent the demographics of the donor population with minimal injuries and stress to the fish.

- a. Monitor operation of adult trapping operations, ensuring compliance with established broodstock collection protocols for each station.
- b. Monitor timing, duration, composition, and magnitude of each run at each adult collection site.
- c. Maintain daily records of trap operation and maintenance (e.g. time of collection), number and condition of fish trapped, and environmental conditions (e.g. river stage, tide, water temperature).
- d. Collect biological information on collection-related mortalities. Determine

- causes of mortality, and use carcasses for stock profile sampling, if possible.
- e. Summarize results for presentation in annual reports. Provide recommendations on means to improve broodstock collection, and refine protocols if needed for application in subsequent seasons.
- d. Monitor fish health, specifically as related to cultural practices that can be adapted to prevent fish health problems. Professional fish health specialists supplied by WDFW (or USFWS for federal agency operations) will monitor fish health.
  - a. Fish health monitoring will be conducted by a fish health specialist. Significant fish mortality to unknown causes will be sampled for histopathological study.
  - b. The incidence of viral pathogens in summer chum broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in the "Salmonid Disease Control Policy" (NWIFC and WDFW 1998).
  - c. Recommendations on fish cultural practices will be provided on a monthly basis, based upon the fish health condition of chum fry.
  - d. Fish health monitoring results will be summarized in an annual report.

**Element 4: Collect and evaluate information on adult returns.**

This element will be addressed through consideration of the results of previous "Elements 1., 2., and 3.", and through the collection of information required under adaptive criteria that will be used as the basis for determining when to stop a supplementation or reintroduction program.

1. Collect age, sex, length, average egg size, and fecundity data from a representative sample of broodstock used in each supplementation program for use as baseline data to document any phenotypic changes in the populations.

2. Compare newly acquired electrophoretic analysis data reporting allele frequency variation of returning hatchery and wild fish with baseline genetic data. Determine if there is evidence of a loss in genetic variation (not expected from random drift) that may have resulted from the supplementation program..

**1.11) Expected size of program.**

**1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).** 97 adult summer chum salmon (39 females and 58 males)

**1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.**

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry	Union River	86,000
Fingerling		
Yearling		

**1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.**  
None available; this is a new program.

**1.13) Date program started (years in operation), or is expected to start.**  
Program proposed to commence with brood year 2000.

**1.14) Expected duration of program.**  
This program is fully consistent with the standards presented in the SCSCI.  
Expected maximum duration is three generations (12 years) for Union River supplementation and three generations (12 years) for Tahuya River reintroduction.

**1.15) Watersheds targeted by program.**  
Tahuya River (WRIA 15.0446); Union River (WRIA 15.0503).

**1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.**  
Alternative actions considered and implemented include integration with habitat and harvest recovery measures identified in SCSCI.

**SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.**

**2.1) List all ESA permits or authorizations in hand for the hatchery program.**  
None in hand; ESA listings are new in this area.

**2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.**

**2.2.1) Description of ESA-listed salmonid population(s) affected by the program.**

The following is paraphrased from life history information for Hood Canal and Strait of Juan de Fuca summer chum presented in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000):

Hood Canal and Strait of Juan de Fuca summer chum populations are one of three genetically distinct lineages of chum salmon in the Pacific Northwest region; and were designated as an evolutionarily significant unit (ESU) based upon distinctive life history and genetic traits. The uniqueness of the summer chum life history is best characterized by their late summer entry into freshwater spawning areas, and their late winter/early spring arrival in the estuaries as seaward-migrating juveniles. Reproductive isolation has been afforded by a significantly different migration and escapement timing and by geographic separation from other chum stocks.

Summer chum spawning occurs from late August through late October. Eggs eye in redds after about 4 to 6 weeks incubation and hatch about 8 weeks after spawning. Fry emerge from redds, usually with darkness, between February and late May and immediately commence migration downstream to estuarine areas. Summer chum fry initially inhabit nearshore areas and occupy sublittoral seagrass beds for about one week and are thought to be concentrated in the top few meters of the water column both day and night. Upon reaching a size of 45-50 mm, fry move to deeper offshore areas. Migrating at a rate of 7-14 km per day, the southernmost outmigrating summer chum fry population in Hood Canal would exit the Canal 14 days after entering seawater (90% of population exits by April 28 each year, on average); and Strait of Juan de Fuca summer chum would exit the Discovery Bay area 13 days after entering seawater (90% completion by June 8 each year, on average).

Summer chum mature primarily at 3 and 4 years of age. The southerly ocean migration down the Pacific Northwest coast from rearing areas in the northeast Pacific Ocean likely commences in mid-July and continues through at least early September. Adults enter terminal areas from early August through late September, with spawning ground entry timing in Hood Canal from late August through mid-October and in Strait of Juan de Fuca from early September through mid-October. Hood Canal and Strait of Juan de Fuca summer chum typically spawn soon after entering freshwater in the lowest reaches of natal streams. Low summer-time flows likely have acted to confine summer chum spawning in this region to the lowest reaches.

**- Identify the ESA-listed population(s) that will be directly affected by the program.**

The program will lead to restoration of Tahuya River summer chum and maintenance of Union River summer chum salmon which are stocks identified as part of the Hood

Canal/Strait of Juan de Fuca Summer Chum ESU.

**- Identify the ESA-listed population(s) that may be incidentally affected by the program.**

The program may incidentally affect listed chinook salmon in the Puget Sound Chinook Salmon ESU by providing additional prey base for chinook. Both naturally-produced, non-indigenous chinook and hatchery chinook are present in the Union River, but it is not possible to identify them separately. While it is not possible to reasonably quantify effects, listed chin incidentally (1) affected by trapping operation of adults where fish are captured, handled and released contact with listed fish during spawner surveys and carcass and mark recovery projects, and (3) sampled otoliths, scales, genetic stock identification, and routine monitoring and evaluation activities. It is not anticipated that the program will impact bull trout since none are known to be present in the area of the program.

**2.2.2) Status of ESA-listed salmonid population(s) affected by the program.**

**- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds.**

In the SCSCI, the Tahuya River summer chum stock is identified as “extinct” since few or no summer chum have been observed since 1989.

In the SCSCI, the Union River summer chum stock is identified as “healthy” due to stable brood year escapements relative to historic levels. In addition, a risk assessment using procedures for measuring extinction risk as presented by Allendorf et al. (1997) was done and the current risk of extinction was judged to be moderate. There has been a declining trend in the abundance of adult spawners the last four consecutive years, 1996 through 1999.

**- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

Data are not presently available for the natural population, but are being collected.

**- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.**

Source of natural spawning abundance data is SCSCI (for 1987 through 1998)

and WDFW files (for 1999):

	<u>Union River</u>	<u>Tahuya River</u>
1987	497	91
1988	629	145
1989	450	9
1990	275	6
1991	208	5
1992	140	0
1993	251	0
1994	738	0
1995	721	0
1996	494	5
1997	410	0
1998	223	0
1999	159	1

**- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

To date there have been no summer chum artificial production efforts on the Union River, therefore 100% of returning adult summer chum to the Union River are natural origin fish.

**2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.**

**- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.**

Listed summer chum salmon adults will be trapped and collected for broodstock from August through October and result in a take. Other listed summer chum adults and listed chinook salmon will be trapped, handled, and passed upstream during trap operation and may lead to injury to listed fish through delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation. The trap will be checked several times daily through the duration of the trapping period to minimize the delay to migrating summer chum and chinook. In addition, the trap will be regularly monitored by on-site staff daily to discourage human disturbance and poaching.

Incubation and rearing of summer chum from September through April has a high

potential to take listed summer chum due to natural mortality causes and due to fish culture activities and conditions which affect fish health and development including handling procedures, fertilization procedures, water temperature, water quality, water flow, feeding success, and transport and/or transition from fresh to saltwater environments. Risk aversion measures minimize the likelihood for the take of listed summer chum (see 5.8). No take of other listed salmonids due to these activities is anticipated.

Physical harm of reared summer chum at release (March through May) due to descaling or increased susceptibility to predation at release has a potential to take listed summer chum, but protocols will be observed to minimize take. No take of other listed salmonids is anticipated.

The contact with summer chum during spawner escapement surveys (August through October), carcass recovery programs (September and October), and other monitoring and evaluation programs has a potential to take listed summer chum, but care is taken not to harm, harass or otherwise disturb summer chum spawners.

**- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.**

No previous summer chum hatchery program.

**- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

For listed summer chum salmon, projected annual take levels are (1) 12,900 eggs or fry mortality during incubation, rearing, and release (based on 98,980 eggs, 85% survival egg to release, and 86,000 fry release); (2) 97 adults removed for broodstock (based on 98,980 eggs, 2500 eggs/female, 1.5 males/female); (3) unintentional lethal take of 10 adults during trapping, holding prior to spawning or release (based on 2% loss of 500 adults trapped); (4) 393 adults affected by trapping operation where fish are captured, handled and released upstream (based on 500 adults trapped minus broodstock and unintentional lethal take); (5) 167 adults affected by contact with listed fish during spawner surveys and carcass and mark recovery projects (based on multiple events and average of 1 occurrence/spawner for one-third of 500 spawners); and (6) 300 carcasses sampled for otoliths, scales, genetic stock identification, and other biological information during spawner surveys, broodstocking, and routine monitoring and evaluation activities (based on target sample size of 300). See Table 1.

Both naturally-produced, non-indigenous chinook and hatchery chinook are present in the Union River, but it is not possible to identify them separately. Hence, it is not possible to reasonably estimate the take of listed chinook. Listed

chinook may be incidentally (1) affected by trapping operation of adults where fish are captured, handled and released upstream, (2) affected by contact with listed fish during spawner surveys and carcass and mark recovery projects, and (3) sampled as carcasses for otoliths, scales, genetic stock identification, and routine monitoring and evaluation activities.

**- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

The take will be limited since the number of broodstock collected will be consistent with guidelines and protocols in the SCSCI and the number of carcasses collected will be consistent with monitoring and evaluation objectives in the SCSCI. Methods to prevent catastrophic loss during incubation, rearing, and release are in compliance with program operations and protocols in the SCSCI (which includes measures to cull surplus production) and will limit take.

### **SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES**

**3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review Report and Recommendations* - NPPC document 99-15). Explain any proposed deviations from the plan or policies.** This program is fully consistent with the guidelines, protocols, and implementation of the co-manager's Summer Chum Salmon Conservation Initiative (SCSCI) (WDFW et al. 2000).

**3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.**

This HGMP is consistent with relevant standing orders and agreements. The Puget Sound Salmon Management Plan (PSSMP) and the Hood Canal Salmon Management Plan (HCSMP) are federal court orders that currently control both the harvest management rules and production schedules for salmon in Hood Canal under the *U.S. v. Washington* management framework. The parties to the SCSCI recognize that it may be necessary to modify these plans in order to implement the recommendations that will result from the SCSCI. However, the provisions of the PSSMP and HCSMP will remain in effect until modified through court order by mutual agreement

### **3.3) Relationship to harvest objectives.**

The summer chum supplementation program is integrated with fisheries management measures as defined in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000). The “base conservation” fishery total harvest rate proposed under the Summer Chum Salmon Conservation Initiative is 10.8% (with a range of 3.3% to 15.3%). These rates reflect incidental fishery harvest levels in Canadian and U.S. fisheries.

#### **3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.**

No directed fisheries on summer chum salmon result from adult fish produced through the Union River or proposed Tahuya River programs. As noted in 3.3, above, the “base conservation” fishery total harvest rate proposed under the Summer Chum Salmon Conservation Initiative is 10.8% (with a range of 3.3% to 15.3%), but should be lower for the Union River stock. These rates reflect incidental fishery harvest levels in Canadian and U.S. fisheries. Exploitation rates on the Union stock have been 42.9%, 15.4%, 78.9%, 51.3%, 33.6%, 23.5%, 11.5%, 17.2%, 5.2%, 2.4%, 16.9%, and 10.9% for the years 1987 through 1998, respectively (WDFW et al. 2000).

### **3.4) Relationship to habitat protection and recovery strategies.**

The summer chum supplementation program is integrated with habitat restoration and management measures as defined in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000). The SCSCI provides a standardized approach to determine freshwater and estuarine limiting factors in each summer chum watershed. Habitat factors for decline and recovery for each watershed are described. In addition, at the ESU scale, protection and restoration strategies for each limiting factor for decline are provided. The goal of the habitat protections and restoration strategy is to maintain and recover the full array of watershed and estuarine-nearshore processes critical to the survival of summer chum across all life stages.

### **3.5) Ecological interactions.**

Chum salmon have an unique relationship with other salmonid species that will generally benefit the other species. In most circumstances, because of their small size and relative abundance at out-migration, summer chum fry have a positive impact as prey for other salmonids, including chinook salmon, coho salmon, and coastal cutthroat trout. In turn, chinook and coho salmon and coastal cutthroat could negatively impact the summer chum supplementation program via predation on summer chum fry, but the risk of significant impact is likely low. Chum have not been identified as predators on other salmonids and have a low risk of negatively impacting salmonids as predators.

The supplementation program will result in an increase in the number of chum

salmon carcasses in freshwater areas and provide a source of nutrients which will benefit other salmonids and non-salmonids.

Supplemented summer chum may compete for food with wild chum fry. This risk will be minimized through the release of supplemented fish at a larger size than the wild fry and should lead to niche separation in the two groups.

## **SECTION 4. WATER SOURCE**

### **4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.**

Summer chum adults are trapped and held in the Union River for spawning and no water is removed from the creek during broodstock collection or holding. Eggs taken from summer chum adults trapped in the Union River will be incubated to the eyed stage at the WDFW George Adams Hatchery. After eye-up, the eggs are transferred to an incubation and initial rearing facility located on Huson Spring, a tributary to the Union River at approximately RM 1.5.

The George Adams Hatchery water is provided by three wells, two rated at 500 gpm, and the third rated at 1200 gpm. Backup water is supplied by a gravity-fed system providing 500 gpm. Temperatures range from 43-50 degrees Fahrenheit, but generally remain within 47-48 degrees. Dissolved oxygen is at saturation.

The Huson Spring facility uses a small volume of gravity-fed water to incubate and rear fish (12 gpm for incubation during November through March; 60 gpm for rearing during March and April), drawn through an intake structure in the spring. The water is returned directly to the tributary near the withdrawal point.

### **4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.**

George Adams Hatchery and Huson Spring facility withdrawal methods (wells, screened intakes) will not lead to injury or mortality to listed fish because the intake structures are supplied by infiltration and are adequately screened to minimize risk to listed fish. The George Adams Hatchery operates under a standing NPDES permit that limits discharge effects on the environment, and requires monitoring of effluent for settle-able and suspended solids. The Huson Spring facility will produce a relatively small amount of fish each year, and well under the 20,000 pounds per year criteria set by WDOE as the limit for concern regarding hatchery effluent discharge effects and for the requirement for an NPDES permit. The NPDES permit and low production levels will likely lead to

no adverse effects on water quality from the program on listed fish.

## **SECTION 5. FACILITIES**

### **5.1) Broodstock collection facilities (or methods).**

Broodstock are collected using a temporary weir and trap positioned in the Union River at approximately RM 0.3. The trap will be designed and built to withstand anticipated high water events. Staff will be present in an on-site trailer and the trap will be checked several times a day. Captured fish are held in the trap or an adjacent holding pen until their removal for spawning or passage upstream. Fish are spawned directly adjacent to the trap. Spawning is accomplished beneath a temporary awning to protect the eggs and milt collected from the fish from rain, as needed.

Fish can also be captured using a modified hook-and-line capture method or by seining the river. Fish would be held in PVC tubes or transported to the holding pen prior to spawning. All methods employed will be consistent with guidelines in the SCSCI.

### **5.2) Fish transportation equipment (description of pen, tank truck, or container used).**

Eggs and milt will be transported chilled in plastic bags by truck from the Union River to George Adams Hatchery and gradually cooled or tempered to incubation water temperature at George Adams Hatchery while in transport. Due to the duration of transport, oxygen will be added to the bags of sperm to extend the active life of the sperm and improve fertilization. Eyed eggs will be transported moist to the Huson Spring facility by truck in 5 gallon buckets cushioned by foam pads. Fed fry will be transported from George Adams Hatchery to Huson Springs facility and later from Huson Springs facility to the mouth of the Union River by truck in a 4' x 4' x 2.5' plastic fish tote aerated with regulated oxygen from an oxygen bottle via air stone, or in a fish transport tank truck.

### **5.3) Broodstock holding and spawning facilities.**

Broodstock will be held in a green pen box (holding pen) located near the trap location. The holding pen will be designed and constructed to withstand anticipated high water events, and will be secured to prevent predation or poaching. The box will also be constructed to allow for segregation of fish by sex and by capture date. Broodstock may also be held in PVC tubes either in the trap, near the trap site, or in the holding pen. All methods employed will be consistent with guidelines in the SCSCI.

Fish will be spawned directly adjacent to the trap. Spawning is accomplished beneath a temporary awning to protect the eggs and milt collected from the fish from rain.

**5.4) Incubation facilities.**

Green and eyed eggs will be incubated in either vertical stack incubators or isolation buckets at George Adams Hatchery. Eyed eggs will be incubated in 55 gallon remote site incubators (RSIs) at the Huson Spring facility, with a maximum loading density of 25,000 eggs per RSI. Each RSI will be supplied with 4-12 gpm inflow for incubation through swim-up.

**5.5) Rearing facilities.**

Swim-up fry at Huson Spring facility will be reared in 16' x 3' x 3' fiberglass raceways, consistent with pond loading density guidelines in the SCSCI.

**5.6) Acclimation/release facilities.**

Fry will be released directly from the Huson Spring facility or transported to a location near the estuary for release.

**5.7) Describe operational difficulties or disasters that led to significant fish mortality.**

This site has a twelve-year history of egg incubation and fry rearing without any significant loss.

**5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

The facility at Huson Spring is supplied by water that is gravity-fed from an adjacent pond. Incubating and rearing eggs and fry will therefore not be affected by power failures. A cell-phone low-water alarm system will be installed to prevent catastrophic fish loss resulting from water system failure. There are at least four volunteers who live within 10 minutes of the incubation site who will be prepared to respond to the alarm. A backup water supply system will be available on site for immediate activation by volunteers responding to an alarm.

Water used for incubation at the George Adams Hatchery is supplied by infiltration wells adjacent to the Skokomish River. The hatchery is supplied with an alarm system and back-up generator in the event of power failure, and is staffed full-time to allow rapid response to other factors, such as flooding, that could harm incubating eggs.

## **SECTION 6. BROODSTOCK ORIGIN AND IDENTITY**

**Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.**

### **6.1) Source.**

This is a new program. Indigenous summer chum will be collected from the Union River.

### **6.2) Supporting information.**

#### **6.2.1) History.**

This is a new program.

#### **6.2.2) Annual size.**

The number of broodstock collected is consistent with the guidelines in the SCSCI. The allowable broodstock collection number is set at 50 % of the total female summer chum return, to limit the effects of the removal of adult fish on abundance and diversity of the naturally spawning population. To achieve the maximum release goal of 86,000 fed fry into the Union River, up to 97 adult summer chum (39 females and 58 males) will be collected.

#### **6.2.3) Past and proposed level of natural fish in broodstock.**

Only summer chum indigenous to the Union River stock will be used as broodstock.

#### **6.2.4) Genetic or ecological differences.**

The indigenous Union River stock is the only source of broodstock. Hence, it is anticipated that there will be no known genotypic, phenotypic, or behavioral differences between the current supplementation stock and the natural stock, but it will be monitored.

#### **6.2.5) Reasons for choosing.**

It is the indigenous Union River summer chum salmon stock. No special traits or characteristics will be selected for in the broodstock within the indigenous stock. The Union River stock is the most appropriate donor stock for reintroduction into the Tahuya River since it is the nearest geographically to the Tahuya River and shows similarities in genetic lineage, life history patterns, and ecology to the extirpated Tahuya River stock.

### **6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.**

The risk of among population genetic diversity loss will be reduced by selecting the indigenous summer chum salmon population for use as broodstock in the supplementation program. The broodstock are collected randomly in a manner representative of the timing and magnitude of the return to the river. No more than 50% of the total number of female summer chum returning to the watershed will be used as broodstock.

## **SECTION 7. BROODSTOCK COLLECTION**

### **7.1) Life-history stage to be collected (adults, eggs, or juveniles).**

Adults

### **7.2) Collection or sampling design.**

Summer chum adults will be captured within the August 1 and October 31 adult migration period each year. Fish not retained for use as broodstock will be released upstream of the trap site to spawn naturally. The trap will be checked several times daily for captured fish, and more frequently during freshets. If it is determined that there is a risk to fish life, the trap will be opened to allow free passage of fish through the trap. As mentioned previously, the allowable broodstock collection number is set at 50 % of the total female summer chum return, to limit the effects of the removal of adult fish on abundance and diversity of the naturally spawning population. Summer chum broodstock are collected randomly as the fish arrive at the trap location, proportional to the timing, weekly abundance, and duration of the total return to the river. WDFW will prepare a sampling schedule to guide the weekly broodstock collection based on the best information available; i.e., initially from spawner survey records and in the future from broodstock collections of previous years. The weir and fish trap are located in the lower reaches of the watershed, near the most downstream point of observed natural spawning activity. Nearly the entire summer chum return to the creek is available for trapping, decreasing the risk that fish trapped through the program are not representative of the total run.

### **7.3) Identity.**

Only one summer chum population is present. Otolith marking of fry and recovery of otoliths from adults will allow identification of hatchery and natural-origin fish.

### **7.4) Proposed number to be collected:**

#### **7.4.1) Program goal:**

39 females plus 58 males for a total of 78 adults

**7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:** No previous broodstock collection activity on the Union River.

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988					
1989					
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997					
1998					
1999					

(Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

**7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

The production of surplus eggs or fish is avoided to the extent feasible by limiting the number of adult summer chum secured through broodstock collection operations. Summer chum adults trapped in excess of program goals will be passed upstream to spawn naturally. Any surplus production will be treated in accordance with protocols set forth in the Summer Chum Salmon Conservation Initiative (WDFW et al. 2000).

**7.6) Fish transportation and holding methods.**

Broodstock will be held in a green pen box (holding pen) located near the trap location. The holding pen will be designed and constructed to withstand anticipated high water events, and will be secured to prevent predation or poaching. The box will also be constructed to allow for segregation of fish by sex and by capture date. Broodstock may also be held in PVC tubes either in the trap, near the trap site, or in the holding pen. Fish will be held for a maximum of 7-10 days prior to spawning or release. All methods employed will be consistent with guidelines in the SCSCI. In the event adult fish must be moved, assistance and appropriate equipment will be provided by the WDFW hatchery staff; transport time will not exceed 60 minutes.

**7.7) Describe fish health maintenance and sanitation procedures applied.**

Fish health monitoring associated with adult fish used in the program is conducted

through the WDFW Fish Health Division. The incidence of viral pathogens in summer chum broodstock will be determined by sampling fish at spawning in accordance with procedures set forth in the Salmonid Disease Control Policy (NWIFC and WDFW 1998). Ovarian fluid, kidney, and spleen samples are collected from all fish spawned for evaluation by WDFW Fish Health Division staff for disease certification purposes.

**7.8) Disposition of carcasses.**

Length data, weight data, scales, DNA tissue samples, GSI tissue samples, and otoliths will be collected from all broodstock carcasses before disposition into the stream for nutrification.

**7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

The risk of fish disease amplification will be minimized by following Salmonid Disease Control Policy (NWIFC and WDFW 1998) sanitation and fish health maintenance and monitoring guidelines. The indigenous population is the broodstock source. The multi-trait distribution of the broodstock closely matches the multi-trait distribution of the target population (similar spawn timing, size, appearance, age structure, etc.). The broodstock collection is technically and logistically possible.

## **SECTION 8. MATING**

**Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.**

### **8.1) Selection method.**

Summer chum broodstock are collected randomly as the fish arrive at the trap location, proportional to the timing, weekly abundance, and duration of the total return to the creek. The weir and fish trap are located in the lower reaches of the watershed, near the most downstream point of observed natural spawning activity. Nearly the entire summer chum annual return to the creek is available to trapping, decreasing the risk that fish trapped through the program are not representative of the total run.

### **8.2) Males.**

Use of backup males is not an integral part of the program, but may occur as a risk aversion measure. Jacks will be used proportional to their abundance in the total return to the creek. It is not anticipated that repeat spawners will be used.

### **8.3) Fertilization.**

Summer chum adults collected at the Union River trap will be spawned adjacent to the weir site. Eggs and milt collected from spawned fish are placed separately in dry, zip-locked bags, and chilled for transport by truck to the George Adams Hatchery. Eggs will be fertilized at the George Adams Hatchery factorially, or using at least a 1:1 spawning ratio. Spawning protocols are done in accordance with the co-managers fish health policy.

### **8.4) Cryopreserved gametes.**

None used.

### **8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.**

1:1 individual matings or a factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the summer chum salmon population that is the subject of this supplementation program.

## **SECTION 9. INCUBATION AND REARING -**

**Specify any management *goals* (e.g. “egg to smolt survival”) that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.**

### **9.1) Incubation:**

#### **9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.**

Consistent with the SCSCI, the following survival rate objectives for each life stage will be applied to all programs; these rates will be used as criteria for measuring the effectiveness of each program.:

<b>Chum Life Stage</b>	<b>% Survival by Life Stage</b>	<b>Cum. % Survival from Green Egg</b>
Green egg to eye-up	90.0 %	90.0 %
Eye-up to Swim-up	99.5 %	89.5 %
Swim-up to release	95.0 %	85.0 %

This program is proposed to begin with brood year 2000.

#### **9.1.2) Cause for, and disposition of surplus egg takes.**

None anticipated. Any surplus production will be handled consistent with protocols in the SCSCI.

#### **9.1.3) Loading densities applied during incubation.**

After fertilization, the eggs will be placed in either vertical stack incubators or isolation buckets for incubation to the eyed egg stage. All eggs will receive an otolith thermal mark at George Adams during incubation. Eyed eggs will be enumerated and transferred to Huson Spring for incubation through hatch in 55 gallon RSIs. Eyed eggs will be incubated at a low density (less than 25,000 per RSI), with each RSI supplied with inflow of 4-12 gpm.

#### **9.1.4) Incubation conditions.**

There is low or no siltation risk due to high quality well water source at the George Adams Hatchery and due to the Huson Spring source.

At the Huson Creek facility, eggs will be protected during tender stage (maintained in darkness, avoid disturbance, etc). Temperature regimes and dissolved oxygen levels are at appropriate levels for salmonid propagation. Previous temperature data indicates a very stable water temperature of 47 degrees Fahrenheit at Huson Spring. Because the spring water used for incubation at Huson Spring facility is warmer and less variable diurnally than ambient water temperatures in the natural incubation environment in the Union River, the development of the summer chum eggs at Huson Spring would be artificially advanced. The eggs at Huson Spring would therefore hatch and swim-up much earlier than their wild counterparts, leading to the potential for diminished

survival if the hatchery fish were released when productivity in the marine environment would be low. However, the 1 to 1.5 month rearing period required to achieve a 1.0 gram average fish size at release planned for the Union River program will act to balance this differential in development rates, so that the hatchery fish are released into the environment during the natural summer chum emigration period in March and April.

**9.1.5) Ponding.**

Fry will be allowed to volitionally release from RSIs into the raceways at Huson Spring. Fry hatched at George Adams Hatchery will be ponded upon absorption of the yolk sac and later be transported from the hatchery to the Huson Spring facility and ponded into the raceways. Average fry size at swim-up is 1250 fpp (0.33 grams.)

**9.1.6) Fish health maintenance and monitoring.**

All summer chum are incubated under the guidance of certified fish health personnel from WDFW and in accordance with the Salmonid Disease Control Policy (NWIFC and WDFW). All eggs transferred from the Union River for fertilization at George Adams Hatchery are water hardened in an iodophore solution. Fungus in incubators is controlled by formalin drip prior to eye-up. Eggs are shocked at eye-up to remove mortalities.

**9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.**

Eggs will be incubated using high quality water to minimize the risk of catastrophic loss due to siltation. All summer chum are incubated under the guidance of certified fish health personnel from WDFW and in accordance with the Salmonid Disease Control Policy (NWIFC and WDFW 1998); see 9.1.6 above. The Huson Spring facility has a 12-year history of egg incubation and fry rearing without any significant loss.

**9.2) Rearing:**

**9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..**

This is a new program.

**9.2.2) Density and loading criteria (goals and actual levels).**

Hatchery rearing densities will be those that yield the highest expected survivals. The following conservative “standard” and “maximum” pond loading densities will be applied in all proposed supplementation programs to promote the release of healthy,

viable fish, as reported in the SCSCI:

Chum size	Pounds fish/gpm inflow		Pounds fish/ft <sup>3</sup> rearing volume	
	Standard	Max.	Standard	Max.
Swim-up	<1.0	1.5	0.5	0.75
1200-600/lb	1.0	2.5	1.0	2.0
600-400/lb	1.5	3.0	1.0	2.0

Actual loading rates at the Huson Creek facility will be consistent with the SCSCI guidelines.

#### **9.2.3) Fish rearing conditions**

There is low or no siltation risk due to high quality spring water source at the Huson Spring facility.

Fry will be allowed to volitionally release from the incubators into the raceways. Temperature regimes and dissolved oxygen levels are at appropriate levels for salmonid propagation. Previous temperature data indicates a very stable water temperature of 47 degrees Fahrenheit at Huson Spring.

**9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.** Biweekly weights, measuring fish per pound (fpp), are taken.

**9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.**

Not collected, applicable, nor available. Fry will be released at 1.0 gram average size to ensure that fry have sufficient energy reserves.

**9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing.**

One to three days after ponding, feed will be introduced to the fry via hand casting and automatic feeders several times per day. Fish will be fed commercial starter diet at the rate of 2.5% per body weight per day throughout rearing. Sample weights to identify fish size and appropriate feeding rates will be taken weekly.

**9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.**

All summer chum are reared under the guidance of certified fish health personnel from WDFW and in accordance with the Salmonid Disease Control Policy (NWIFC and WDFW 1998). Fish are monitored daily during rearing for sign of disease, through observation of feeding and swimming behavior and monitoring

of daily mortality trends. Preferred and maximum pond loading and feeding parameters are adhered to at all times, as specified in the SCSCI (WDFW et al. 2000).

**9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.**

Not applicable.

**9.2.9) Indicate the use of "natural" rearing methods as applied in the program.**

None.

**9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.**

The Huson Spring facility is supplied by water that is gravity-fed from an adjacent pond. Incubating and rearing eggs and fry will therefore not be affected by power failures. The Huson Spring facility has a 12-year history of egg incubation and fry rearing without any significant loss. The facility will be equipped with a low flow alarm which will be monitored by several volunteer crew members who are able to respond within several minutes. The alarm system will operate by using a cellular phone system, making it more reliable during storm events. The back-up water supply will be either gasoline operated or gravity fed, also making it more reliable during storm events. The facility will not be staffed full time, but the operation will be checked at least once daily during operation and more often during high flows and/or extreme cold weather events. Uniform rearing methods will be applied across egg take groups. Fry will be reared for 30 to 45 days which limits risk of domestication.

## **SECTION 10. RELEASE**

**Describe fish release levels, and release practices applied through the hatchery program.**

**10.1) Proposed fish release levels.**

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry	86,000	300-550	March - April	Union River
Fingerling				
Yearling				

**10.2) Specific location(s) of proposed release(s).**

**Stream, river, or watercourse:** Union River, WRIA 15.0503

**Release point:** Union River, either at Huson Spring, RM 1.5, or at mouth, RM 0.1

**Major watershed:** Lynch Cove

**Basin or Region:** Hood Canal

**10.3) Actual numbers and sizes of fish released by age class through the program.**

This is a new program without any release history.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
Average								

**10.4) Actual dates of release and description of release protocols.**

This is a new program without any release history.

Fry will be released en masse directly from the Huson Spring facility or transported to a Union River location as close to the estuary as possible for release en masse. Releases from Huson Spring facility would attempt to distribute returning spawners across all available summer chum spawning areas upon return. Releases near the estuary would allow for rapid exodus from freshwater and minimize the number of fish that may be lost to predation. See 10.11 for other risk aversion measures.

**10.5) Fish transportation procedures, if applicable.**

Fed fry will be transported in ambient temperature freshwater to the mouth of the Union River in a 4' x 4' x 2.5' plastic tote aerated with regulated oxygen via air stone, or in a WDFW supplied fish transport truck; transport takes < 60 minutes.

**10.6) Acclimation procedures**

Direct release in the Union River.

**10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.**

100% otolith-marked.

**10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.**

None anticipated. Any surplus production will be handled consistent with protocols in the SCSCI.

**10.9) Fish health certification procedures applied pre-release.**

Examination by WDFW fish pathologist prior to release.

**10.10) Emergency release procedures in response to flooding or water system failure.**

If fish are at the eyed egg and/or alevin stage, regulated oxygen can be administered directly into the clarifier barrel supplying the RSIs. Buttoned up or fed fry may be released directly into Huson Springs.

**10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.**

The fry are released en masse in the evening, on a high tide, to minimize the incidence of avian and fish predation. Fed fry are released that will maximize survival, and minimize the risk of interaction with wild summer chum fry that adhere to nearshore waters during the time of 1.0 gram chum fry release.

## **SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS**

**11.1) Monitoring and evaluation of “Performance Indicators” presented in Section 1.10.**

**11.1.1) Describe plans and methods proposed to collect data necessary to respond to each “Performance Indicator” identified for the program.**

It is planned that all “Performance Indicators” identified in Section 1.10 will be monitored and evaluated.

**11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.**

Funding, staffing, and support are available and committed for current Monitoring and Evaluation. Additional funds may be needed to support allozyme, DNA and otolith analysis.

**11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.**

It is anticipated that adherence to monitoring and evaluation protocols in the SCSCI will not elevate risk to listed summer chum or chinook salmon.

## **SECTION 12. RESEARCH**

Not applicable to this program. Research currently underway or planned for similar summer chum supplementation projects at Big Beef Creek and Quilcene National Fish Hatchery will provide valuable information regarding the effects and success of chum supplementation programs and be applicable here.

**12.1) Objective or purpose.**

Not applicable

**12.2) Cooperating and funding agencies.**

Not applicable

**12.3) Principle investigator or project supervisor and staff.**

Not applicable

**12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.**

Not applicable

**12.5) Techniques: include capture methods, drugs, samples collected, tags applied.**

Not applicable

**12.6) Dates or time period in which research activity occurs.**

Not applicable

**12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.**

Not applicable

**12.8) Expected type and effects of take and potential for injury or mortality.**

Not applicable

**12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).**

Not applicable

**12.10) Alternative methods to achieve project objectives.**

Not applicable

**12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.**

Not applicable

**12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.**

Not applicable

### **SECTION 13. ATTACHMENTS AND CITATIONS**

Allendorf, F.W., D. Bayles, D.L. Bottom, K.P. Currens, C.A. Frissell, D. Hankin, J.A. Lichatowich, W. Nehlsen, P.C. Troter, and T.H. Williams. 1997. Prioritizing Pacific salmon stocks for conservation. *Conservation Biology* Vol. 11 No. 1 p. 140-152.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Olympia. 212 p.

Washington Department of Fish and Wildlife. 1996. Fish health manual. Hatcheries Program, Fish Health Division, Washington Dept. of Fish and Wildlife, Olympia. 69 p.

Northwest Indian Fisheries Commission and Washington Department of Fish and Wildlife. 1998. Salmonid Disease Control Policy. Olympia.

Washington Department of Fish and Wildlife and Point-No-Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative. Hood Canal and Strait of Juan de Fuca Region. Jim Ames, Chris Weller, Gary Graves, editors. Fish Program, Washington Department of Fish and Wildlife, Olympia.

**SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

“I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Thom H. Johnson, District Fish Biologist, WDFW      March 27, 2000

Certified by \_\_\_\_\_ Date:

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: <u>Summer chum salmon</u> ESU/Population: <u>Hood Canal Summer Chum ESU / Union River</u> Activity: <u>Supplementation</u>				
Location of hatchery activity: <u>George Adams Hatchery / Union River trap/ Huson Spring facility</u>				
Dates of activity: <u>August -May</u> Hatchery program operator: <u>WDFW, Hood Canal Salmon Enhancement Group</u>				
Type of Take	Annual Take of Listed Fish By Life Stage ( <i>Number of Fish</i> )			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)			167	300
Collect for transport b)				
Capture, handle, and release c)			393	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			97	
Intentional lethal take f)				
Unintentional lethal take g)			10	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.